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10/761,047	01/20/2004	Stephen R. Van Doren	200313631-1	1166

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EXAMINER	
BURGESS, BARBARA N	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

MN

Office Action Summary	Application No.	Applicant(s)	
	10/761,047	VAN DOREN ET AL.	
	Examiner	Art Unit	
	Barbara N. Burgess	2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-38* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-38* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to Request for Continuation Examination (RCE) filed August 27, 2007. Claims 1-38 are presented for further examination.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cypher (US Patent 6,877,056 B2) in view of Arimilli et al. (hereinafter "Ari", US Patent Publication 2002/0129211 A1) in further view of Bauman et al. (hereinafter "Bauman", US Patent 7,032,079 B1).

As per claims 1, 29, and 34, Cypher discloses a system and method comprising:

- A first node that provides a broadcast request for data, (column 6, lines 40-50, column 14, lines 35-50, column 20, lines 20-60);
- A third node that provides the requested data to the first node in response to the broadcast request from the first node, the first node filling the data provided by the third node in a cache associated with the first node (column 21, lines 25-40).

Cypher does not explicitly disclose:

- the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

Cypher, in view of Ari, does not explicitly disclose:

The first node including conflict state machine for managing non-data responses to the broadcast request for the data provided from the first node;

The conflict machine transitioning to a conflict state in response to the first node receiving the read conflict response.

However, in an analogous art, Bauman discloses when a conflict is detected with a read request, the state machine processing the original request will set a state bit and an indicator that causes response out queue to remove data from the read buffer (column 13, lines 53-67).

Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious to implement or incorporate Bauman's state machine in Ari's system in order to indicate there is no longer any provisional data entry within the read buffer.

As per claim 2, Cypher discloses the system of claim 1, wherein the broadcast request provided by the first node is a source broadcast read request (column 8, lines 45-57).

As per claim 3, Cypher discloses the system of claim 2, wherein the first node provides a read conflict response to the broadcast read request from the second node, the read conflict response provided by the first node indicating that the broadcast read request of the first node conflicts with the pending broadcast read request of the second node (column 15, lines 1-18).

As per claim 4, Cypher discloses the system of claim 3, wherein the third node provides the requested data to the second node in response to the broadcast read request from the second node, the second node filling the data provided by the third node in a cache associated with the second node (column 22, lines 38-49).

As per claim 5, Cypher discloses the system of claim 1, wherein the request for data broadcast by the first node is a source broadcast write request (column 17, lines 15-30).

As per claim 6, Cypher does not explicitly disclose the system of claim 5, wherein the first node provides a second conflict response to the pending broadcast read request from the second node, the second conflict response provided by the first node indicating that the write request broadcast by the first node conflicts with the broadcast read request from the second node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 7, Cypher discloses the system of claim 6, wherein the broadcast request provided by the first node is broadcast using a first cache coherency protocol, the second node in response to the second conflict response provided by the first node reissues the pending broadcast read request of the second node (column 21, lines 33-44).

Cypher does not explicitly disclose conflict state machine.

However, in an analogous art, Bauman discloses when a conflict is detected with a read request, the state machine processing the original request will set a state bit and an indicator that causes response out queue to remove data from the read buffer (column 13, lines 53-67).

Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious to implement or incorporate Bauman's state machine in Ari's system in order to indicate there is no longer any provisional data entry within the read buffer.

As per claim 8, Cypher discloses the system of claim 7, wherein the first cache coherency protocol is a source broadcast cache coherency protocol and the second node reissues the broadcast read request using a forward progress cache coherency protocol (column 9, lines 11-19).

As per claim 9, Cypher discloses the system of claim 6, wherein the third node provides the requested data to the second node in response to the pending broadcast read request of the second node (column 19, lines 50-67).

Cypher does not explicitly disclose the second conflict response provided by the first node preventing the second node from filling the data provided by the third node in a cache associated with the second node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a

second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 10, Cypher disclose the system of claim 6, wherein the third node provides shared data to the second node in response to the pending broadcast read request of the second node, the second node filling a cache associated with the second node with the shared data and associating an invalid state with the shared data filled in the cache associated with the second node (column 23, lines 23-45).

As per claim 11, Cypher discloses the system of claim 1, wherein the third node comprises one of a home node and an owner node (column 5, lines 12-28).

As per claim 12, Cypher discloses the system of claim 1, wherein the broadcast request provided by the first node is broadcast using a source broadcast cache coherency protocol (column 13, lines 40-58).

Cypher does not explicitly disclose conflict state machine.

However, in an analogous art, Bauman discloses when a conflict is detected with a read request, the state machine processing the original request will set a state bit and an indicator that causes response out queue to remove data from the read buffer (column 13, lines 53-67).

Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious to implement or incorporate Bauman's state machine in Ari's system in order to indicate there is no longer any provisional data entry within the read buffer.

As per claim 13, Cypher discloses the system of claim 1, wherein the first node defines a first processor and the second node defines a second processor, the first and second processors having an associated cache, the associated caches of the first and second processors each comprising a plurality of cache lines, each cache line having a respective tag address that identifies associated data and each cache line having state information that indicates a state of the associated data for the respective cache line, the first and second processors being capable of communicating with each other and with other nodes of the system tllrough an interconnect (column 25, lines 1-38).

As per claim 14, Cypher discloses the system of claim 13, further comprising a first cache controller associated with the first processor and a second cache controller associated with the second processor, the first cache controller being operative to manage data requests and responses for the associated cache of the first processor,

the first cache controller effecting state transitions associated with the data in the associated cache of the first processor based on the data requests and responses for the associated cache of the first processor, the second cache controller being operative to manage data requests and responses for the associated cache of the second processor, the second cache controller effecting state transitions associated with the data in the associated cache of the second processor based on the data requests and responses for the associated cache of the second processor (column 12, lines 34-50).

As per claim 15, Cypher discloses the system of claim 13, wherein the system implements a hybrid cache coherency protocol wherein each of the first, second, and third processors employs a source broadcast-based protocol to issue a request for the data and provide responses for the data, and employs an associated second protocol to reissue a request for the data in response to the request failing in the source broadcast protocol, the second protocol employing a forward progress technique (column 20, lines 50-60).

As per claims 16, 24, Cypher discloses a multi-processor network and computer system comprising:

- A first processor node operative to issue a first source broadcast request for data (column 12, lines 23-39);
- A second processor node operative to issue a second source broadcast request for

the data (column 12, lines 45-55);

- A third node operative to provide a data response in response to the respective source broadcast requests of the first and second processor nodes, the third node being one of an owner processor node and a memory node (column 18, lines 1-12).

Cypher does not explicitly disclose:

- The second processor node being operative to provide a read conflict response to the first source broadcast request when the second source broadcast request is a read request, the second processor node being operative to provide a second conflict response to the first source broadcast request when the second source broadcast request is a write request;
- The first processor node being operative in response to receiving a read conflict response from the second processor to implement a cache with the data provided by the third node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

Cypher, in view of Ari, does not explicitly disclose:

The first node including conflict state machine for managing non-data responses to the broadcast request for the data provided from the first node;

The conflict machine transitioning to a conflict state in response to the first node receiving the read conflict response.

However, in an analogous art, Bauman discloses when a conflict is detected with a read request, the state machine processing the original request will set a state bit and an indicator that causes response out queue to remove data from the read buffer (column 13, lines 53-67).

Therefore, one of ordinary skill in the art at the time the invention was made would have found it obvious to implement or incorporate Bauman's state machine in Ari's system in order to indicate there is no longer any provisional data entry within the read buffer.

As per claim 17, Cypher discloses the multi-processor network of claim 16, wherein the first processor node is operative in response to a write conflict response from the second processor node to issue a request for the data using a forward progress technique (column 24, lines 12-45).

As per claim 18, Cypher does not explicitly discloses the multi-processor network of claim 17, wherein the second conflict response from the second processor node

prevents the first processor node from implementing the cache with the data provided by the third node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 19, Cypher discloses the multi-processor network of claim 16, wherein the first source broadcast request is one of a source broadcast write request and a source broadcast read request (column 9, lines 35-56).

As per claim 20, Cypher discloses the multi-processor network of claim 16, wherein the source broadcast request issued by the first processor node exists concurrently with the source broadcast request issued by the second processor node (column 15, lines 25-55).

As per claim 21, Cypher discloses the multi-processor network of claim 16, wherein the third processor node provides shared data to the second processor node in response to the second processor node providing the second source broadcast request as a broadcast read request, the second processor node filling the shared data in a cache associated with the second processor node and associating an invalid state with the data in the cache associated with the second processor node (column 28, lines 22-46).

As per claim 22, Cypher discloses the multi-processor network of claim 16, wherein each of the first, second, and third processor nodes has an associated cache that comprises a plurality of cache lines, each cache line having a respective tag address that identifies associated data and having state information that indicates a state of the associated data for the respective cache line, the first, second, and third processor nodes being capable of communicating with each other and with other nodes of the system through an interconnect, the multi-processor network further comprising a first cache controller associated with the first processor node, a second cache controller associated with the second processor node, and a third cache controller associated with the third processor node, the first cache controller being operative to manage data requests and responses for the associated cache of the first processor, the first cache controller effecting state transitions associated with the data in the associated cache of the first processor based on the data requests and responses for the associated cache of the first processor, the second cache controller being operative to manage data

requests and responses for the associated cache of the second processor, the second cache controller effecting state transitions associated with the data in the associated cache of the second processor based on the data requests and responses for the associated cache of the second processor, the third cache controller being operative to manage data requests and responses for the associated cache of the third processor, the third cache controller effecting state transitions associated with the data in the associated cache of the third processor based on the data requests and responses for the associated cache of the third processor (column 20, lines 45-67, column 21, lines 1-44, column 22, lines 27-49).

As per claim 23, Cypher discloses the multi-processor network of claim 16, wherein the network implements a hybrid cache coherency protocol in which each of the first, second, and third processor nodes employs a source broadcast-based protocol to issue requests for data and provide responses to requests, and employs an associated protocol employing a forward progress technique to reissue a request for data in response to a request failing in the source broadcast protocol (column 29, lines 20-30).

As per claim 25, Cypher discloses the computer system of claim 24, wherein the first processor in response to the second conflict response of the second processor is operative to reissue the source broadcast request from the first processor by issuing a request for the data employing a forward progress protocol (column 20, lines 19-33).

As per claim 26, Cypher discloses the computer system of claim 24, wherein the second conflict response from the second processor prevents the first processor from filling the data provided by the third processor in the cache associated with the first processor (column 22, lines 45-67).

As per claim 27, Cypher discloses the computer system of claim 24, wherein the third processor provides a shared data response to the first processor in response to the source broadcast request for the data, the first processor being operative to place the shared data in the cache associated with the first processor and associate an invalid state with the data in the cache associated with the first processor (column 27, lines 15-40).

As per claim 28, Cypher discloses the computer system of claim 24, wherein the computer system implements hybrid cache coherency protocol in which each of the first, second, and third processor employs a source broadcast-based protocol to issue requests for data and provide responses to requests, and employs an associated protocol employing a forward progress technique to reissue a request for data in response to a request failing in the source broadcast protocol (column 12, lines 32-50).

As per claim 30, Cypher discloses the system of claim 29, wherein the means for providing a broadcast request from the first node comprises means for providing a broadcast read request for the data from the first node, the system further comprising:

- Means for providing the requested data to the second node from the third node in response to the broadcast read request of the second node (column 21, lines 10-35);
- Means for filling the data provided to the second node by the third node in a cache associated with the second node in response to the second node receiving the read conflict response from the first node (column 22, lines 30-55).

Cypher does not explicitly disclose:

- Means for providing a read conflict response from the first node to the second node in response to the broadcast read request of the second node, the read conflict response from the first node indicating that the pending broadcast read request of the second node conflicts with the broadcast read request for the data from the first node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 31, Cypher discloses the system of claim 29, wherein the means providing a broadcast request from the first node comprises means for providing a broadcast write request for the data from the first node, the system further comprising:

- Means for reissuing the broadcast read request of the second node employing a forward progress protocol in response to the second conflict response provided by the first node (column 19, lines 10-27).

Cypher does explicitly disclose:

- Means for providing a second conflict response from the first node to the second node in response to the pending broadcast read request of the second node, the second conflict response from the first node indicating that the pending broadcast read request of the second node conflicts with the broadcast write request for the data from the first node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 32, Cypher disclose the system of claim 31, further comprising means for preventing the second node from placing the data provided by the third node in a cache associated with the second node in response to the second conflict response provided by the first node (column 10, lines 22-45).

As per claim 33, Cypher discloses the system of claim 29, wherein the means for providing the data from the third node to the first node is operative to provide shared data to the first processor, the means for placing the data provided by the third node placing the shared data in the cache associated with the first processor, the system further comprising means for associating an invalid state with the data in the cache associated with the first processor (column 25, lines 38-55).

As per claim 35, Cypher disclose the method of claim 34, wherein providing a source broadcast request from the first node comprises providing a source broadcast read request from the first node, the method further comprising:

- Providing the requested data to the second node from the third node in response to the pending broadcast read request of the second node (column 22, lines 45-67);
- Placing the data provided to the second node by the third node in a cache associated with the second node (column 21, lines 12-36).

Cypher does not explicitly disclose:

- Providing a read conflict response from the first node to the second node in response to the pending broadcast read request of the second node, the read conflict

response from the first node indicating that the pending broadcast read request of the second node conflicts with the source broadcast read request provided by the first node. However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 36, Cypher discloses the method of claim 34, wherein providing a broadcast request from the first node comprises providing a broadcast write request from the first node, the method further comprising:

- Preventing placement of the data in a cache associated with the second node in response to the second conflict response provided by the first node (column 20, lines 22-39).

Cypher does not explicitly disclose:

- Providing a second conflict response from the first node to the second node in response to the pending broadcast read request of the second node, the second conflict response from the first node indicating that the pending broadcast read

request of the second node conflicts with the broadcast write request provided by the first node.

However, the use and advantages for the first node receiving a read conflict response to the broadcast request from the first node, the read conflict response indicating that a second node has a pending broadcast read request for the data is well known to one skilled in the relevant art at the time the invention was made as evidenced by the teachings of Ari (paragraphs [0026, 0032]).

Therefore, one of ordinary skill in art at the time the invention was made would have found it obvious to incorporate or implement Ari's first node receiving a read conflict response to the broadcast request from the first node in Cypher's system in order to determine what action should be taken.

As per claim 37, Cypher discloses the method of claim 36, further comprising reissuing the source broadcast read request of the second node as a forward progress protocol read request for the data from the second node in response to the second conflict response provided by the first node (column 25, lines 1-30).

As per claim 38, Cypher disclose a computer system comprising a hybrid cache coherency protocol that employs source broadcast protocol mode and a forward progress protocol mode, the computer system being operative to fill a cache line associated with a source node with requested data provided in response to a source broadcast protocol mode request for the data when there is a source broadcast protocol

read conflict with another node in the computer system, the computer system being further operative to reissue a request for the data from a source node using a forward progress protocol mode request for the data when there is a source broadcast protocol second conflict with another node in the computer system (column 27, lines 12-33, 55-67).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara N. Burgess whose telephone number is (571) 272-3996. The examiner can normally be reached on M-F (8:00am-4:00pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Ettinene can be reached on (571) 272-4001. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Barbara N Burgess
Examiner
Art Unit 2157